PARALLEL COMPUTING ON THE NAVIER-STOKES SOLVER WITH THE MULTIGRID METHOD

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Abstract

This paper is aimed to present the combination of the parallel computing and the multigrid method on the Navier-Stokes solver. The combination is based on the concept of the objected-oriented programming (OOP), which is consisted of the 3 independently separate modules: Navier-Stokes, Multigrid and Parallel module. The multigrid method is implemented by employing the full approximate scheme (FAS) for numerically solving the non-linear Navier-Stokes equations. The overall computation is performed by using the parallel computing in which many numbers of computers are concurrently computed for the same task but on different sub-data. The second-order upwind differencing scheme is used for discretising the convective terms to obtain more accurate solutions. The two-dimensional laminar flow in a cavity is used as a test case. It is found that the computational time is decreased when employing the combination of the multigrid method and the parallel computing.

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